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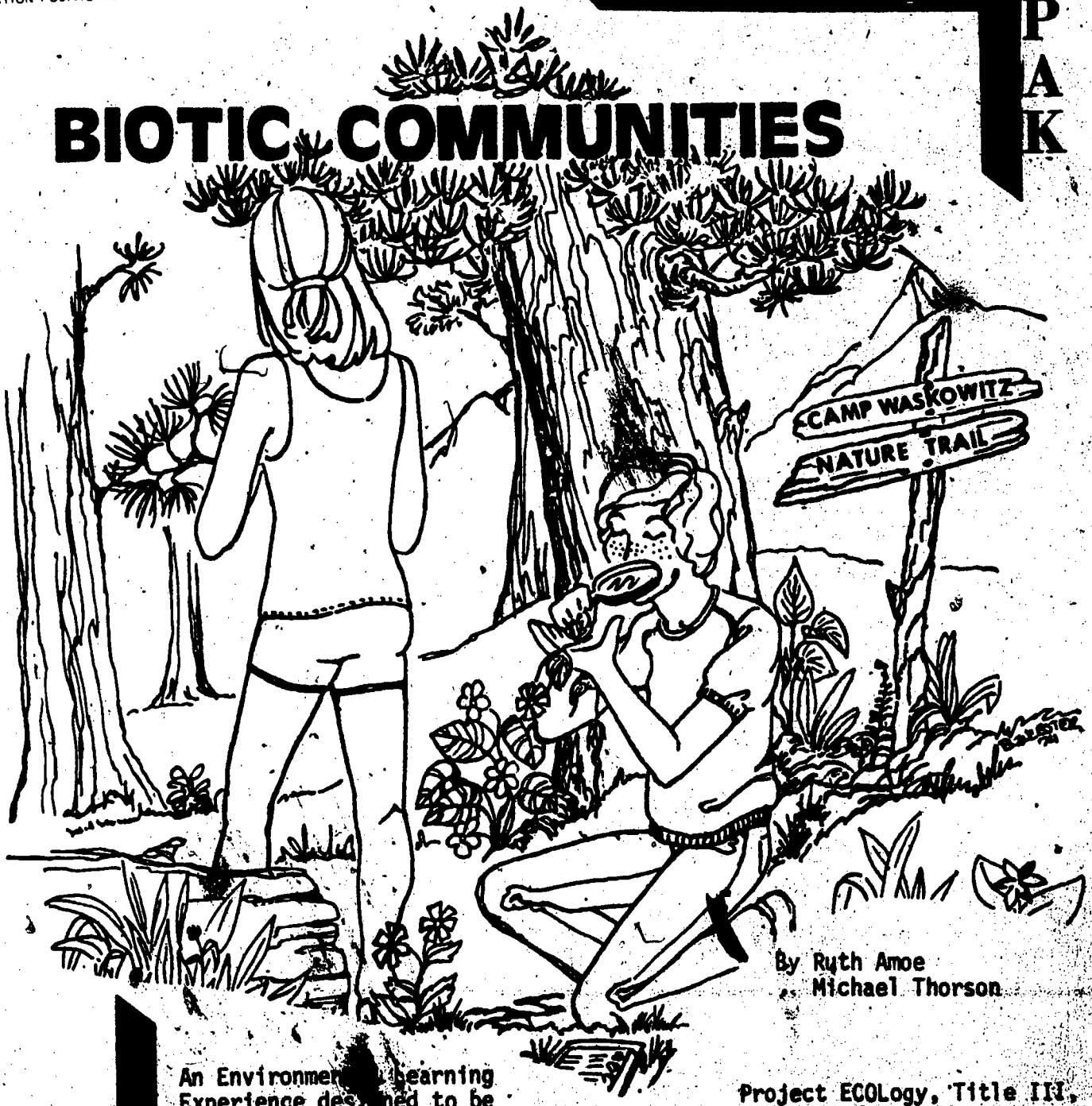
ABSTRACT

This is one of a series of units for environmental education developed by the Highline Public Schools. This unit provides a number of activities to introduce students to ways of studying biotic communities, help them become good observers, and provide them with opportunities to use their skills. The materials include suggested activities, and forms to assist data collection. The materials are designed for use with upper elementary - junior high school students. (RH)

AMOE-THORSON PAK

BIOTIC COMMUNITIES



By Ruth Amoe
Michael Thorson

An Environmental Learning Experience designed to be a comparative study of biotic communities utilizing discovery method of learning. One of many "ELE PAKS" available for all areas.

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BIOTIC COMMUNITIES

by Ruth Amoe
Mike Thorson

Photo Item #	Amt	Description	Source
1	12	Soil tester	CB
2	3	Thermometer	CB
3	2	"The Pacific Coastal Wildlife Region"	WSU
4	1	Manual	PE
5	12	"Trees of Washington State"	WSU

THIS ELE PAK IS A COMPARATIVE STUDY OF DISTINCTLY DIFFERENT BIOTIC COMMUNITIES. IT IS DESIGNED TO FACILITATE THE DISCOVERY METHOD OF LEARNING AND HAS SMALL GROUP ACTIVITIES AS AN INTEGRAL PART OF THE PROGRAM.

The Pak contains:

WHAT'S IT ALL ABOUT?
- A. Introduction
- B. Background Information
- C. Rationale
- D. Study Approach
  1. Discovery Method of Learning
  2. Group Work
  3. Group Work Ground Rules

WHAT'S IN IT FOR THE KIDS?
- Objectives

WHAT TO ROUND UP
- A. Books
- B. Films, Filmstrips
- C. Kit Supplies
- D. Materials You'll Need To Secure

GETTING STARTED — Time: 3-5 days — Location: School and surrounding area
- A. Motivation and Introduction Ideas
- B. Vocabulary Ideas
- C. Practice In-field Study Activity
- D. Practice Field Data Sheets

OUT IN THE FIELD! — Time: 1 full day — Location: Camp Waskowitz or a similar native site which provides a variety of biotic communities
- A. Teacher Information For In-field Study Activity
- B. Map of Three Distinct Biotic Communities at Camp Waskowitz
- C. Field Study Data Sheet
- D. Leader/Aide Guide

DOING SOMETHING WITH WHAT WE'VE LEARNED — Time: 5-10 days — Location: Classroom
- A. Teacher Information
- B. Forms to Compare Biotic Communities

OTHER THINGS YOU CAN DO
- Suggestions of Further Activities

WAS IT WORTH IT?
- A. Testing Explanation
- B. Student Attitudinal Test
- C. Student Conceptual Test
- D. Teacher Evaluation of Success of Study

SAMPLE STUDENT HANDBOOK

WHAT'S IT ALL ABOUT?

Introduction

Have you ever noticed two neighboring areas of native plant growth that are very different? A certain type of predominant growth will grow in one area and a totally different kind will grow near-by. Perhaps you will see a coniferous stand right next to a deciduous area. Sometimes the boundary lines are distinct and other times they will feather or fade together.

Haven't you wondered why two or more such biotic communities can be so distinctly different yet inhabit the same general environment? There are reasons for differences in plant niches. Subtle differences, to be sure, but the variety of all biotic growth is fostered in the subtlety of the combinations of environmental factors.

Sometimes the difference is in altitude (i.e., the tundra line) other times it may be soil conditions (chemical and physical), water supply, drainage, temperature, wind factor, animal control, diseases, logging, clearing, protection, of the stage in the predominant plant growth cycle. Any one of these factors (or one of many others) may be reason enough to dictate a change in plant growth from one biotic community to the next. The variety of combinations of determining factors together with the variety of plants and their requirements can produce an infinite variety of neighboring biotic communities.

The first major activity is learning to use the data gathering tools in small groups at their school. The second activity is designed to look closely at three distinctly different biotic communities using data gathering tools and scientific methods of recording. This is either a field trip or done at Camp Waskowitz. The third major activity is using the scientific data in the classroom to reach conclusions about the sites, make decisions about himself and his surroundings and synthesize his role in the total ecological environment.

We will be looking at some of the more obvious environmental factors to try to determine the reasons for differences (temperature, soil conditions, water supply, drainage, acid or alkaline condition of soil, levels of growth, animal evidences). The prime objective is not to determine the reasons for differences but to become aware that there are differences as well as similarities and what are some of the more elementary determining factors in natural plant selection.

In the Pacific Northwest, an evergreen coniferous groove, a deciduous stand and an area of mixed growth would be the most obvious study for comparative research. Other parts of the country would choose other categories of plant growth for comparative study perhaps.

You may have an area in close proximity to your school that you can study. This would give you an opportunity to compare changes during the different seasons. This is bound to give you more basis for comparisons than does research done at a given point in time. Parks which have been kept in natural state are excellent areas to study. You will need to check to see if you need to have permission for using the area.

We have chosen Camp Waskowitz as our study area because of convenience and familiarity. If you have a sixth grade class, you can plan to do the research during your week of Outdoor Education at Camp. Regardless of grade level you can make arrangements to take a field trip for a day (a bus goes to Camp every Wednesday). You will need to make early arrangements for this convenience.

One advantage for sixth graders is that you can arrange to make the field trip during a different season than your week stay. This Pak can be used as a lead-up to your camp experience. This would also give you excellent opportunity to study seasonal plant changes.

This Pak is designed to give you and your students the opportunity to observe study, think, discuss and discover some questions and answers that are both scientific and attitudinal.

BACKGROUND INFORMATION

WHAT IS A HABITAT?

Every living thing lives, or does not live, in a certain spot for a definite reason. The place where an organism can and does live is called its habitat. The habitat provides the correct amounts of sunlight and rainfall, the proper soil, food supply, oxygen or carbon dioxide, temperature, and shelter for the organism. These factors act as invisible "strands" that tie the organism to its habitat by meeting the organism's minimum requirements and presenting no more than the maximum tolerances allowed by it.

WHAT IS A BIOTIC COMMUNITY?

One area may provide habitats for a large variety and number of organisms living together in an atmosphere of cooperation, competition, and neutrality which forms a biotic community. An acre of woods can contain many biotic communities with differing vegetation, temperature, sunlight, and water, and a soil with a different texture, pH, and composition. These communities are not static, but are constantly evolving and changing.

WHAT IS A NICHE?

The role that each organism plays within this community is its niche. This niche is determined by what the organism produces for the community, or what it destroys, or what it allows to survive.

HOW DO HUMANS AFFECT BIOTIC COMMUNITIES?

Human beings, like every other organism, have their own niche in their biotic communities. They may help other organisms to survive by cultivating certain plants, providing optimum growing conditions for them, and protecting them from their natural enemies - or humans may destroy by tearing out a woods and installing a blacktop parking lot - they may cause a change. Kicking over a stone destroys the habitat for the organisms that dwell under it, but in turn sets up a new habitat for other organisms to move in - or he may live with the other organisms in a state of neutrality. The problem in the past has been that people did not realize (or care) that they were affecting the whole structure of their own biotic community in their building of our present technological society.

WHY IS THIS IMPORTANT TO KNOW?

This question is well answered with a quotation by Peter Farb from Ecology, page 16, Time Incorporated, New York, 1963.

"At first glance, it may not seem terribly urgent to man whether a particular species inhabits the sunlit or shaded side of a boulder, or even whether different kinds of periwinkles find separate ecological niches only a few inches from each other on a rocky shore. Yet the presence or absence of forms of life filling these niches will determine the success of other species of life associated with them, and these in turn will have a marked effect upon still others. No organism lives without affecting its environment and being affected in turn. And it has been increasingly demonstrated that the intricate strands that form the ecological web of life also enmesh mankind."

RATIONALE

Have you ever felt that we teach children skills, concepts, the use of tools and how to gather information, but not what to do with this new knowledge? An example of this, if you're a sixth grade teacher at Camp Waskowitz, is taking a nature walk. The children may be astute observaters of the plant and animal life, be able to identify specific plants and be keenly interested in the preservation of the environment. These are attitudes we wish to foster in our environmental studies. Why do we make provisions for the development of these kinds of attitudes? What do we want the children to do with this knowledge and these attitudes?

Ultimately we want them to think. We want them to draw some conclusions from the observations and skills that they have gained. We want them to make some decisions about their environment. If that is our goal, then let's build that into the total learning experience. Children need practice in decision-making, drawing conclusions and synthesizing just as they need practice in the multiplication tables.

In this Pak the activities are planned so that the children are introduced to close observation, learn what to look for and become familiar with use of data-gathering tools and data recording in the section entitled GETTING STARTED. In OUT IN THE FIELD the children become astute observers and are led to begin drawing conclusions about the interrelationships of environmental factors. In the section DOING SOMETHING WITH WHAT WE'VE LEARNED, the children are led into consolidating the data they have gathered, draw conclusions about the relationships of the information, making decisions as a group or as an individual and synthesizing the impact of this type of activity in their lives.

STUDY APPROACH

DISCOVERY METHOD

The most meaningful knowledge is that which we discover for ourselves. It is when information is internalized that we can make the best use of it. The Discovery Method of Learning lends itself to environmental learning experiences. Essentially, the Discovery Method is presenting a problem(s) to the children, providing them with opportunities for solving the problem and giving them a reason for applying it to their lives. This method provides a framework for:

1. introducing new concepts, skills, tools
2. using these concepts, skills, tools
3. gathering information, research
4. drawing on past experiences and learnings
5. making decisions about the why, when, where, what and how he is learning
6. drawing conclusions based on his learning
7. synthesizing relationships between self and environment
8. self motivation because the child is involved in his learning
9. peer motivation because excitement in learning is catching
10. building self-image because every child is successful
11. exploring group roles
12. developing tutor/tutee relationships in a natural way

The Discovery Method of Learning in this package is facilitated through three types of activities.

In the Lead-up Activities (GETTING STARTED) three types of activities are provided:

1. motivating ideas (several of these are explained - pick and choose the ones that fit you)
2. vocabulary development (gives a broader base of understanding - can be integrated with language arts)
3. practice in-field study (group work, scientific recording, use of the tools initiated through short activities)

An In-field Research Activity (OUT IN THE FIELD) is planned to provide fact-finding experiences based on the practice in-field study. This activity is designed to be used one of the days the class is at Camp Waskowitz or on a one day field trip to Camp Waskowitz. Keep in mind that this material can be used to compare any biotic communities which are distinctly different in environment and are convenient to you. The material for this activity includes:

1. teacher information
2. map of the three areas at Camp Waskowitz to be studied
3. forms for gathering basic scientific information regarding the ecological factors of each biome
4. leader/guide directions.

In the Follow-up Activities (DOING SOMETHING WITH WHAT WE'VE LEARNED) the children are provided an opportunity to compare notes through large and small group discussions, make decisions about the reliability of the information, draw in-depth conclusions about the information they have gathered, and synthesize about the relationship between this information and their environment. Extensive forms are provided for drawing conclusions about each site and comparisons between the three sites. You may find that you want to add or subtract from these forms so that it will fit your program. The questions can be considered a comprehensive test.

What about the role of the teacher? Think of yourself as the one to prime them (get them interested), facilitator (make it possible), guide (give assistance and direction only where needed), and learner (get in and get excited in learning with them). The children will learn! All you have to do is provide the opportunities, materials and reason!!

GROUP WORK

If you have never tried small group work, this is a good way to get into it full scale. We use it in all subject areas. We recommend group work for this Pak because:

it insures success for every child - success is the most important ingredient in building a positive self-image. A successful student is a self-motivated learner.

it facilitates individuality. Each child will contribute to the group according to his talents and receive from his group that which he needs. Every child will work on his capability level and at his own rate of learning;

it gives children the opportunity to interchange the teacher/student roles. Children will and do assume the teacher role in some instances and readily reverse roles in another instance. When you notice a child teaching, you are priviledged to see learning at a maximum. When it is a child who is generally thought of as being a "low achiever" (reading, writing, arithmetic) cherish it -- you will know why you became a teacher;

it simulates real-life working situations more closely than any other learning activity. One of the major goals in education should be learning to use skills and tools that will be useful to students as adults. Working and sharing in a group is certainly a real phenomenon;

it gives an opportunity for children to discover, explore and develop their roles in group situations. Roles within a group often change according to the activity and experience of the people involved. They should become aware of whether they are performing as a leader, contributor, absorber or observer (of the others). It is good to discuss the feeling of satisfaction one receives from each role.

ORGANIZATION

You may want to choose the group members in your initial group activities but don't be afraid to let them choose their own group partners. In the beginning they will probably form convenience or friendship groups but as they become experienced in group work they will find that "working groups" may be but are not always friendship groups.

Every group needs a chosen leader and assistant (democratic governing) to be responsible for the way the group runs - organization, work required, behavior, time lines.

Before beginning group work, discuss what makes a good "working group":

What is the role of the leader?
What is the role of the assistant?
Do you know what you will be doing?
Do you know where to go and when to be back?
Do you know the rules about going to the lavatory or to get a drink?
If the activity requires a leader/aide, what is that person supposed to do?
What is your role if you are not a leader or assistant?
Where will the teacher be?

After each group activity, discuss how effective their groups were:

Did you enjoy your group?
What made it a good or not-so-good group?
How can each member make it more effective?
Do you enjoy working in a group that has members who don't contribute?
How can you help them?
Are you a leader, contributor, absorber or observer of the group?

To the Teacher - Ground Rules!

1. Get their attention. Let them know that you're waiting quietly for their attention so they will be sure to know what they are to do.

2. Give general instructions of what they will be doing. Be short and clear.

3. Give specifics of activities - how, what, where, how long. Be positive ("You may go as far as the cedar tree.") Negative suggestions tend to invite negative actions. ("Don't go past the cedar tree.")

4. Give them a specific amount of time to form "working groups" of specific numbers. ("In five minutes be in working groups of three.")

5. Give specific amount of time to organize their group as to who is leader, secretary, material-keeper, etc. ("In 45 seconds, please----" or "By the time I count to 30, please ----"). Keep all organization times short as it forces them to make decisions with less confusion and haggling.

6. Recap direction very briefly.

7. Give specifics as to how, when and where activity is to end. ("At 11:30 we will gather at the fountain to sit down and discuss what we found.")

To Students - Group Responsibilities

1. You will need a leader and assistant (who are responsible for the behavior, the safety, the organization of the group).

2. You are responsible for a specific amount of work as a group.

3. The more you put into the group work, the more you will get out of it and the more you will enjoy it.

4. Stay together at all times!

5. Meet time lines.

A really great group is one in which the members are cooperative and work at helping each other.

WHAT'S IN IT FOR THE KIDS?

OBJECTIVES

The children will gather and record information in a variety of distinctly different biotic communities.

The children will gather and record basic scientific information as to:
- water content, acidity and texture of the soil
- identification of plants in the biome at the three levels of growth habit
- soil and air temperature
- sun and shade conditions
- rainfall estimation
- animal habitation in the biome
- basic history of the area and specifically the immediate biome

The children will use tools and skills necessary to gather information.

The children will develop and use a vocabulary related to this ecological study.

The children will work in groups.

The children will use small and large group discussions to compare information gathered.

The children will assume responsibility in group situations as to role, productivity, behavior, leadership.

The children will develop tutor/tutee relationships within the working groups.

The children will come to conclusions about organisms living in certain environments due to certain conditions.

The children will synthesize the relationship of this knowledge to the total ecology picture.

The children will synthesize the relationship of this knowledge to their own lives.

The children will explore career opportunities that are related to and affected by this study.

WHAT TO ROUND UP

RESOURCE BIBLIOGRAPHY

With the surge of interest in our environment in the past few years there have come many books and filmstrips which deal with ecology, biotic communities, plant life, animals, soil, water, photosynthesis, and air.

Before starting this Pak we suggest you ask your resource librarian to put together a cart of books, filmstrips, and other materials that will be of help to you and your students during the study. That way you will have them readily available for unexpected questions, browsing, research, and fieldwork.

The references that we have listed are the ones we feel will be of greatest use for this unit.

BOOKS

Andrews, William A., Soil Ecology, Prentice-Hall, 1973

Billington, Elizabeth T., Understanding Ecology. Frederick Warne and Company, Inc., 1968

Brown, Vinson, Reading the Woods. The Stackpole Company, 1969. This field study book gives clues about what to look for in the woods and what the various kinds of evidence mean. Good charts.

Chase, Myron, Field Guide to Tracks, Nasco Nature Study Guides, 1969.

Chase, Myron, Field Guide to Edible and Useful Wild Plants, Nasco, 1965.

Colby, C. B., The First Book of Animal Signs. Franklin Watt, Inc., 1966, Take this book with you when you are hoping to discover some animal tracks.

Farb, Peter, Ecology. Time, Inc., 1970. (One of the Time-Life Nature Library)

McCombs, Lawrence G., What's Ecology, Addison Wesley, 1963

Nickelsburg, Janet, Ecology (Habitats, Niches, and Food Chains) J. B. Lippincott Co., 1969

Platt, Rutherford, 1001 Answers to Questions about Trees, Grosset and Dunlap, 1959. Great for really inquisitive students and a help for the teacher, too.

Pringle, Laurence, Ecology (Science of Survival) Macmillan Company, 1971

Pringle, Laurence, From Field to Forest (How Plants and Animals Change the Land) World Publishing Company, 1970. A photographic essay that beautifully shows the rejuvenal cycle of one biotic community as it changes from a bare patch of land to a forest.

Sterling, Dorothy, The Story of Mosses, Ferns, and Mushrooms. Doubleday and Co., Ind. 1955

Storer, John H., The Web of Life (A First Book of Ecology) Devin-Adair Company, 1967

Yocom, Charles, Dasmann, Ray, The Pacific Coastal Wildlife Region, Naturegraph Co., Healdsburg, California 1965

Zim, Herbert S., and Alexander C. Margin, Flowers (A Guide to Familiar American Wildflowers) Golden Press, 1950

Zim, Herbert S. and Alexander C. Martin, Trees (A Guide to Familiar American Trees) Golden Press, 1956. The above two books are excellent to use as field guides and for work with specimen identification.

FILMSTRIPS

Building the Soil. McGraw-Hill Book Company, #694711

Forest Plant and Animal Relationships. McGraw-Hill Book Company, #694714

How Does Man Change Ecosystems? Educational Coordinates; Graphicom, 1970

What is an Ecosystem? Educational Coordinates; Graphicom, 1970

The Web of Life. McGraw-Hill Book Company, #405595

FILM

The Soilmakers - This may be difficult to get because it is contained in some of the Camp Waskowitz kits, but it is excellent to use before the field study because it shows students what to look for when searching for evidence of insect life in the forest.

Kit Supplies

12 soil thermometers
12 soil testing kits
12 plant identification book
2 books: The Pacific Coastal Wildlife Region, $2.95 each
Yocom, Charles, Ray Dasmann, Naturegraph Co., Healdsburg, CA., 1965

Materials you will need to secure for Practice In-Field Study:

12 baby food jars with lids for gathering soil samples
1 roll of masking tape to label jars

For your convenience the films used in this ELE are listed on this tear out sheet. Simply add the dates required and mail to the Instructional Material Center, ERAC.

Project ECOLogy

Detach here

INSTRUCTIONAL MATERIALS - HIGHLINE PUBLIC SCHOOLS

Please try to place orders
3 weeks in ADVANCE in DUPLICATE

Symbols for materials not booked:
NA - not available
Sub - substitution
WD - withdrawn

ORIGINAL

SCHOOL _____ TEACHER _____ GRADE _____ DATE _____

FILMSTRIP NO.	FILMSTRIPS - TITLE	DATE WANTED	NOT WANTED AFTER	DATE CONFIRMED	FILMS	DATE WANTED	NOT WANTED AFTER	DATE CONFIRMED
	Building the Soil				The Soilmakers			
	Forest Plant and Animal Relationships							
	How Does Man Change Ecosystems?							
	What is an Ecosystem?							
	The Web of Life							

Before beginning motivation activities please administer pre-test.

HOW TO GET STARTED

You probably have some ideas of how you would like to begin this learning package. The suggested activities may serve as primers to further your creative thinking. Pick and choose what fits you and your class.

Mini Observations - A fun thing to do! A good way to begin this Pak. Spread the children out in a grassy area. Have them take three somersaults in any direction; lie face down and spread their arms to make a circle of approximately 2 feet in diameter. Using this as an imaginary boundary line, have them look very carefully to see what they can discover within the circle. Direct their thinking to plants, animals, soil, stones, moisture, etc. You might ask them to make a list or take small specimens to compare results in class.

Nature walk - Take your children on a walk around your own playground or a nearby native area. Stop frequently to talk about the differences in plant growth at different levels of growth, in different areas, during different seasons. How many similarities can you find?

Sit down in one place and be absolutely quiet for 5-10 minutes. Listen to the sounds around you - nature sounds. Be watchful of the miniature world around you. The movement of a grass leaf, the path of ants, a hole of the earthworm. Watch a spider spin a web. Let a caterpillar crawl across your arm. How many questions can you formulate in your mind while you are being quietly observant. (How? Why? Where does it go? How does it do that? How many legs does it have? How does it eat? Where does it live?)

Guest speaker - Have you ever had your local naturalist in for just a friendly chat with your class about nature and his interests? You may know of nature lovers within your own neighborhood. If not, ask around. The speaker need not be a professional naturalist, just enthused and interesting. You will probably want to talk with your speaker beforehand to communicate just what you want this nature talk to do: get their attention, produce wonderment, induce unanswered questions, promote enthusiasm, whatever. Emphasis should be on informality, obvious enthusiasm, variety of specimens in nature.

Mr. Harry Lemon is a marvelous resource person to whip up interest in nature. Rick Sullivan, Bill Weppler, Carl Jensen are excellent speakers from our own district, who are most knowledgeable about Camp Waskowitz.

ACTIVITIES TO MOTIVATE

Notebooks - This is a good time to begin construction of a notebook, to accommodate your past or future nature study material. A notebook is an excellent way to help develop organization of and responsibility for their own material. If this is their first notebook, give them assistance in proper order and form.

Basic Components:

Decorated Cover - the finished size of the notebook determines materials to use (binder, folder, make your own from wood or cardboard)
Title Page
Index
Body - organized according to subject, activities or time (use dividers)
Encourage pictures, illustrations and appropriate printed articles.
Bibliography - may be included after each related article

Ideas for notebook entries:

Soil Study
1. profiles (see Camp materials)
2. numerous soil test results
3. geological study of earth layers
4. soil conservation - Send away for materials (U. S. Dept of Agriculture)

Animal Study
1. Research one animal or family
2. Sketches
3. Study of native animal habitats
4. Research of track identification
5. Study of pelts - (supply at Camp)

Mapping
1. Learn how to map
2. Map own area
3. Map of Camp
4. Imaginary maps

Insect Study
1. Show results of traps around your school
2. Research common insects
3. Photography of webs or habitats
4. Art projects using insect ideas.

Compass
1. Camp compass course
2. Make a course of your school grounds
3. Compass instruction sheet

Weather Study
1. Water cycle
2. Cloud observation and diary
3. Weather diary
4. Temperature records

Nature Cycles
1. Food web
2. Life chain
3. Water cycle
4. Plant cycle
5. Weather cycle

Camp Waskowitz Collection, Diary or Record Plant Study
1. Plant classification
2. Venation, margin, bud arrangement
3. Plant growth pattern
4. Germination experiments
5. Diary of a house plant
6. Diary of 3 types of plants during spring month (deciduous, conifer, ground plant)
7. Dissection of a leave - cell study
8. Plant identification
9. Photosynthesis experiments
10. Specimen Gathering - An independent activity in which the children gather leaf or seed specimen from around their homes and bring to school. In small groups they can pool their knowledge to identify as many as possible. This is a good time to introduce the plant identification resources available to them in your school.

    They may want to mount their identified specimen on heavy paper to be included in their notebooks or make a large composite identification wall chart to be added to as they find new specimens. If you are using leaves, be sure to press them in a telephone book or newspapers for at least two weeks before mounting with rubber cement.
11. Identification of Native Specimens - Give the students a working page for each suggested specimen (see next page for an example). They are to independently locate each specimen in their home community and record the necessary information. At this time they should collect and press a specimen for each so that they can later mount them to enter in their notebooks.

    When they are at Camp (or any designated different biotic community), they locate the plants again and record the information. They now have comparative data to make some limited conclusions about the niches of these specific plants.

    When their notebooks are near completion, they should mount the specimen, which have been pressed and record the scientific data. For the working page, ditto copies on lightweight paper are sufficient but you will want to use heavy paper (tagboard or biology paper) for mounting the specimens because of the weight of the specimen.

Suggested Native Specimens to Gather

- Salal
- Sword Fern
- Oregon Grape
- Red Huckleberry
- Ocean Spray Spirea
- Alder
- Pacific Dogwood
- Western Red Cedar
- Douglas Fir
- Western Hemlock
- Madrona

Make a page for each specimen as below.

Western Hemlock			
Home	Camp	Home	Camp
List the native plants that are growing near your specimen plant.		Describe the smell of the soil.	
#	#		
		Color and texture of the soil.	
		Is the soil wet, damp, dry?	
Approximate height of specimen.		Is the plant in a sunny or shady place?	

VOCABULARY DEVELOPMENT

This study lends itself beautifully to the interaction of the study disciplines because of the extensive vocabulary possibilities. You may want to work it into creative writing, reading, research or spelling.

Ecology Dictionary: You could begin a class dictionary of ecology vocabulary to be added to all year. At the end of the year, you could have a copy typed and bound for use in the library. Each child may want to keep their own dictionary. It is a good addition to their nature notebook.

VOCABULARY

acidity
alkaline
biome
biotic community
broadleaf
climate
coniferous
cycle
data
deciduous
deductions
dominance
ecology
environment
evergreen
habitat
humus
hypothesis
maturity
microclimate
neutral
niche
nutrients
organic
organism
pH
photosynthesis
predominant
prime
regeneration
soil
specimen
subdominance
texture
vegetation

PRACTICE IN-FIELD STUDY

Teacher Information - In this activity the children will go to the school grounds to learn to use the soil testing kit and soil thermometer and how to record data that they will need to come to conclusions about their scientific observations. Let them know that this is a practice session so that they will be comfortable and efficient on a more extensive in-field study later on.

How to use the soil testing tools:
The soil testing kit should contain easy directions. In general the pH of soil is determined by a simple chemical test where a sensitive indicator solution (in the kit) is added directly to a soil sample in a test plate or tube (in the kit). Allow sediment to settle. The pH is measured by the color the soil turns the solution (a color chart is contained in the kit).

The soil thermometer is large and sturdy. It may be Fahrenheit or Centigrade measurement. Caution: The thermometer is breakable. Make a hole in the soil with a pencil before inserting the thermometer. Be sure to carry it in the case!

What do you need:

Each group:	1 baby food jar (label with group #)
	1 soil test kit
	1 soil thermometer
	1 plant identification book
Each student:	pencil
	clip board, notebook or other hard surface for writing
	1 soil data chart
	1 vegetation data chart

Getting ready to go into the field (school yard):
See Group Work: To the Teacher - Ground Rules for specifics in group organization.

1. Distribute the Practice Field Data Sheets to the children so that they will be familiar with them before going into the field to work. You will notice that the forms are instructive in nature and need little lead-up. Give them time to go over the sheets. This is the time to ask questions.
2. Have the children form "working groups" of three students each, to go into the school grounds (biome) to gather information about a particular site (biotic community). Within the group the children should decide who is to be leader, who is responsible for the soil testing kit and who has charge of the soil thermometer and identification book. Assign each group a number.
3. Draw a freehand map of the total area on the chalkboard. Designate where each group is to go by placing numbers on the map. Be sure each group understands where their biotic community is. You will need to decide whether your group must be within your sight range or if they can be responsible for the activity without constant adult supervision.
4. Distribute soil testing kits, thermometers and identification books. Check to be sure that each child has pencil, hard writing surface and data sheets.
5. Designate a time for activity to end (approximately 30 min.) and where the total group is to gather to compare data.
6. Be sure that they know where they are to go, what they are to do and when they are to return. You will want to circulate between the groups, giving assistance, encouragement and adding enthusiasm.
7. At the agreed upon time, gather at the designated place to compare data about the different biotic communities. You may want to have them compare by groups (two groups compare and then move to another group to compare) or by total class discussion.

Discuss the whys in relation to the similarities and differences they discover. Ask questions to encourage them to come to their own conclusions even if they are wrong. They'll make other decisions later, based on gained knowledge and experience.

Have them look carefully at the soil samples (color, texture, composition, moisture). See if they can come to any conclusions as to the relationship those characteristics have to the pH readings and the kinds of plants growing in each area.

You might want to lead the class into researching pH findings. This could be in a section of the conservation notebook related to soil. A pH test on any substance will indicate the acidity or alkalinity of the substance. In soil, a low pH reading (0.0-7.0) indicates acidity and a high pH reading (7.0-14.0) indicates alkalinity with 7.00 indicating neutrality. Acid soil is composed of a large amount of rotting organic matter. Evergreen plants usually require an acid soil. Grasses and deciduous plants generally require an alkaline or neutral soil.

The children now have had experience in the discovery method of learning, small group work, making decisions and drawing conclusions based upon their research. They are familiar with the data gathering tools and material, and in-field data gathering techniques. They are ready to go into an area to observe three biotic communities, make scientific notations and come back to the classroom to make indepth conclusions about relationships within these communities, between these communities and what that has to do with them and their future.

PRACTICE FIELD DATA SHEET
Levels of Vegetation

Name _____ Group Number _____

The purpose of these sheets is to give you some experience in gathering and recording data. It will help you work efficiently when you actually go out to a wooded area to observe and record data to bring back to the classroom for further study and discussion.

A. Look around you for the tallest plants you can see. These will usually, but not always, be trees. These plants are in the upper level of vegetation.
   1. Find the place on the chart for the upper level and write the name of one of the kinds of plants you see in this level.
   2. Decide how many plants of this same kind there are in this general area. Check the appropriate box for either many, few, or one.
   3. Do this same thing for two other kinds of plants you can see in this same level. (Not every area will have three different kinds in this level so record this accordingly.)

B. Decide which plants are in the middle level of vegetation. These will generally be shrubs and small trees. They should be taller than your waist but not as tall as the plants in the upper level. Record data for this level the same way you did for the upper level.

C. Study the lowest level of vegetation (grasses, wildflowers, ferns, vines) and record three types of them on your chart.

LEVELS OF VEGETATION

Upper level - more than 3 times taller than you - 10 ft. +

Name	Many	Few	One

Middle level - higher than your waist

Name	Many	Few	One

Lowest Level - ground level up to your waist

Name	Many	Few	One

PRACTICE FIELD DATA SHEET

SOIL

Name _____ Group Number _____

Maybe you've noticed how different soils seem to be in different places. Near the ocean the soil is almost all sand, and along some river banks it is thick and slimy with clay, fill dirt pushed along a ditch is likely to be light colored and gritty, mixed with rocks, while in the woods it often feels soft and rich and looks chocolate brown. Soil does vary from place to place and maybe you can discover some of the reasons for this.

A. Find a spot where the soil is exposed. Use a stick or pencil to make a hole five or six inches deep and insert the thermometer into it. Ease the dirt around the stem of the thermometer and let it remain in the soil for about five minutes before you read and record the temperature.
B. Use the kit instructions to take a pH reading of the soil in this same spot.
C. Look carefully at the color of the soil.
D. Feel the soil to determine its texture. You may need to study the whole area to decide whether or not it is rocky.
E. How wet does the soil feel?
F. Hold some of the soil in your hand and try to squeeze it into a ball. Does it retain this shape when you unclasp your hand?
G. Can you describe the smell of the soil? You may not agree with the others of your group on the smell of the soil, but give your own opinion.
H. Fill your soil sample jar with soil from your area. Label the jar with your group number.

Use the chart below to record the data from above:

SOIL DATA

A	The temperature is: degrees		Fahrenheit ☐	Centigrade ☐
B	What is the pH of the soil?			
C	The color is:	yellow-brown ☐	Chocolate-brown ☐	almost black ☐
D	The texture is:	rocky ☐	somewhat rocky ☐	not rocky ☐
E	The soil is:	wet ☐	damp ☐	dry ☐
F	Can you mold your sample into a ball?		yes ☐	no ☐
G	Describe the smell of the soil:			

FIELD STUDY DATA SHEET

NAME _____ LEADER _____ GROUP NUMBER ____

BIOTIC COMMUNITY # _____

LEVELS OF VEGETATION

Upper Level				Middle Level				Lower Level			
Name	Many	Few	One	Name	Many	Few	One	Name	Many	Few	One

SOIL DATA

A	The temperature is:	degrees	Fahrenheit ☐	Centigrade ☐
B	What is the pH of the soil?			
C	The color is:	yellow-brown ☐	chocolate brown ☐	almost black ☐
D	The texture is:	rocky ☐	somewhat rocky ☐	not rocky ☐
E	The soil is:	wet ☐	damp ☐	dry ☐
F	Can you mold your sample into a ball?		Yes ☐	no ☐
G	Describe the smell of the soil:			

LANDFORMS

What interesting objects or landforms do you find in this area?

Object	Possible Origin	Location

ANIMAL DATA

Can you identify any signs of animal or insect life in this area?

Evidence	Location	Animal

IN FIELD STUDY ACTIVITY

Teacher Information

In this activity the children will be gathering research data about three distinctly different biotic communities which are in close proximity. They will work in groups of 5-6 students and one leader-aide. Have the children form "working groups" before leaving school. You may want to be a leader-aide of a group or circulate between groups. This activity is where the meat of the Pak is. It is in this activity that the children can demonstrate their mastery of the soil testing tools. This is where they gather the information that they will use in class to make comparative studies about different biotic communities. From this activity the children can gain background that will help them to make conclusions about these three biotic communities, their total environment, and the relationships between them and the total ecology picture.

This activity is designed to be carried out at Camp Waskowitz while in residence or you may arrange a field trip to Camp on the day the bus goes up empty. It's fun to go in a different season than your regular camp experience so that the children can make seasonal comparisons. Please note that the activity can be carried out in any area that provides a variety of distinctly different biotic communities.

In residence of Camp Waskowitz

You will want to make sure that you take all of the materials with you to run this activity.

High school counselors are assigned to you on a daily basis so you won't need to make further arrangements for leader-aides. Go over the activity, time schedules and map with the aides. They should know how to use the tools. If not, let the groups instruct their own aides in this.

The actual work in data gathering could be done in a two hour span such as the morning class time or afternoon class time but that would be rushing the students through the research and have them rushing from place to place.

A more comfortable schedule would be:

1.	Biotic community _____	9:30
2.	Biotic community _____	10:15
	Camp schedule - Meet at bell	11:30
3.	Biotic community _____	1:30
4.	Afternoon break _____	2:15
5.	Class discussion, sharing and recap	2:45
	Camp schedule - meet at bell	3:30

If you have added extra time instruct your leader-aides in short alternate activities mini hike, nature "sit and watch", short scavenger nature hunt, look for something no one else would find or see your camp materials for further ideas.

Field trip

If you are planning to run this activity on a field trip you will want to make sure that you have planned carefully:

travel arrangements
permission to use site
lavatory facilities
lunch arrangements
shelter if necessary
arrangements for leader-aides
providing materials
plan for breaks

As with any field trip you will need to make arrangements through the district office. That office will take care of travel, lavatory arrangements and give you ideas for lunch possibilities. Usually they will take care of permission to use the site.

If you go to camp you can use the facilities there which are not being used by residence groups. You can probably use the campfire facilities to cook or the Council Hall to sit around the fireplace to eat a sack lunch. Be sure to check in advance. It is difficult to plan for cooking out (who is to bring what, how much do we need, how do we cook it?) but it is well worth it. You might want to make Hamburger stew in a can for lunch and fry biscuits. Apple crisp or fried doughnuts and cocoa are good break ideas. If you cook have a dry run with your class at school.

You will need to make early arrangements for leader-aides. You may be able to arrange for high school students who have been camp counselors to assist you. You will need to clear it through their home school rather than going directly to the students. If you have particular students in mind, say so. Another possibility would be cadets working in your building. Parents are a good choice of leader-aides.

The leader-aides would feel more comfortable if you had a short meeting with them to fill them in about the events of the day. Go over the Leader-Aide Guide with them - schedule, map, sample data sheet. The children can instruct them on the use of the tools. Let them know they are not in a teaching role but one to insure safety, enthusiasm, promptness and security. They will probably be relieved. If you are cooking, go over the complete recipe and procedure. This is one area where the children will need help and instruction.

You will want to plan a short break in the morning, sufficient time for lunch (especially if you are preparing and cooking it) and a short break in the afternoon before boarding the bus. Your schedule might look like this if you go to camp.

Board bus	7:00
Arrive at camp and orientation	8:00
Biotic community _____ (fill in) _____	8:30
Break - snack at campfire	9:30
Biotic community _____ (fill in) _____	10:30
Lunch preparation	11:30
Short recreation	1:00
Biotic community _____ (fill in) _____	1:30
Group discussion, sharing, recap in Council Hall	2:30
Break - snack in Council Hall	3:15
Recreation	3:30
Board bus	4:00

Plan ahead for breaks. As mentioned earlier you may wish cooking a snack or having the children bring their own - or both if you have morning and afternoon breaks. Remember they left early and will get home late.

Talk to your leader-aides about short activities they may do if they find they have extra time: mini walks, scavenger nature hunts, nature "sit and looks","I see something that is yellow, has four wings and hops", be dehumanizers (pick up signs of man-litter), look for something to share with the class, see your camp materials for other ideas.

Plan for one large group activity or several small group activities to have during your recreation time. Avoid turning them loose to run off steam on their own.

Try to plan break times for your leader-aides and yourself during the children's breaks. Take turns supervising and relieving each other.

Plan on rain! It's a very long day and can get cold and damp if not properly prepared. Rain won't really hurt anything if everyone is dressed for it but can ruin the whole day if not. Insist that the children wear or bring waterproof coats, boots and hats - adults, too! They can always be stashed somewhere if you are blessed with good weather.

This sounds like a lot of preparation and planning for a field trip. It is but it is well worth it. It is not only a fun day, but a real learning experience.

Whether on a field trip or at camp for the week, be cautious about planning too many things in the day. Plan for the three biotic community researches to be unrushed. Allow plenty of time to move from activity to activity (part of the learning is absorbing and appreciating nature). Build in your break times but keep it flexible in case you need to make changes. Have alternative or fill in activities available for you and your leader-aides to make every minute count.

Materials you'll need

- 3 data gathering sheets per child
- soil test kit for each group
- thermometer for each group
- plant identification book for each group
- lunch for each person
- break snacks for each person
- first aid kit
- raingear for each person
- pencil for each person - a few extra
- a hard writing surface (notebook is ideal as it helps protect the sheets)
- backpack for each group to carry the tools. If each person has one they can carry their own supplies.

Leader-Aide Guide

Name _____

LEADER/AIDE GUIDE

Leader _____

Group _____

_____

_____

_____

_____

Before you start be sure you have:

A. Leader/Aide Guide Folder which contains:
   - Leader/Aide Guide Sheet
   - Sample Study Guide Sheet
   - Name tags
   - Map of the three biotic community sites

B. For each student in your group:
   - pencils
   - 3 Field Study Guide Sheets - one for each site
   - clipboard, notebook, or other hard surface to write on

C. For group use:
   - soil testing kit
   - soil and air thermometers
   - specimen identification books

Your group is responsible for completing the data sheets for each of the three sites. You are free to plan your time allowing for the needs of the individuals in your group. The only set time guides are listed below.

Order of biotic communities:

Start at site # _____
Go on to site # _____
End with site # _____

Schedule:

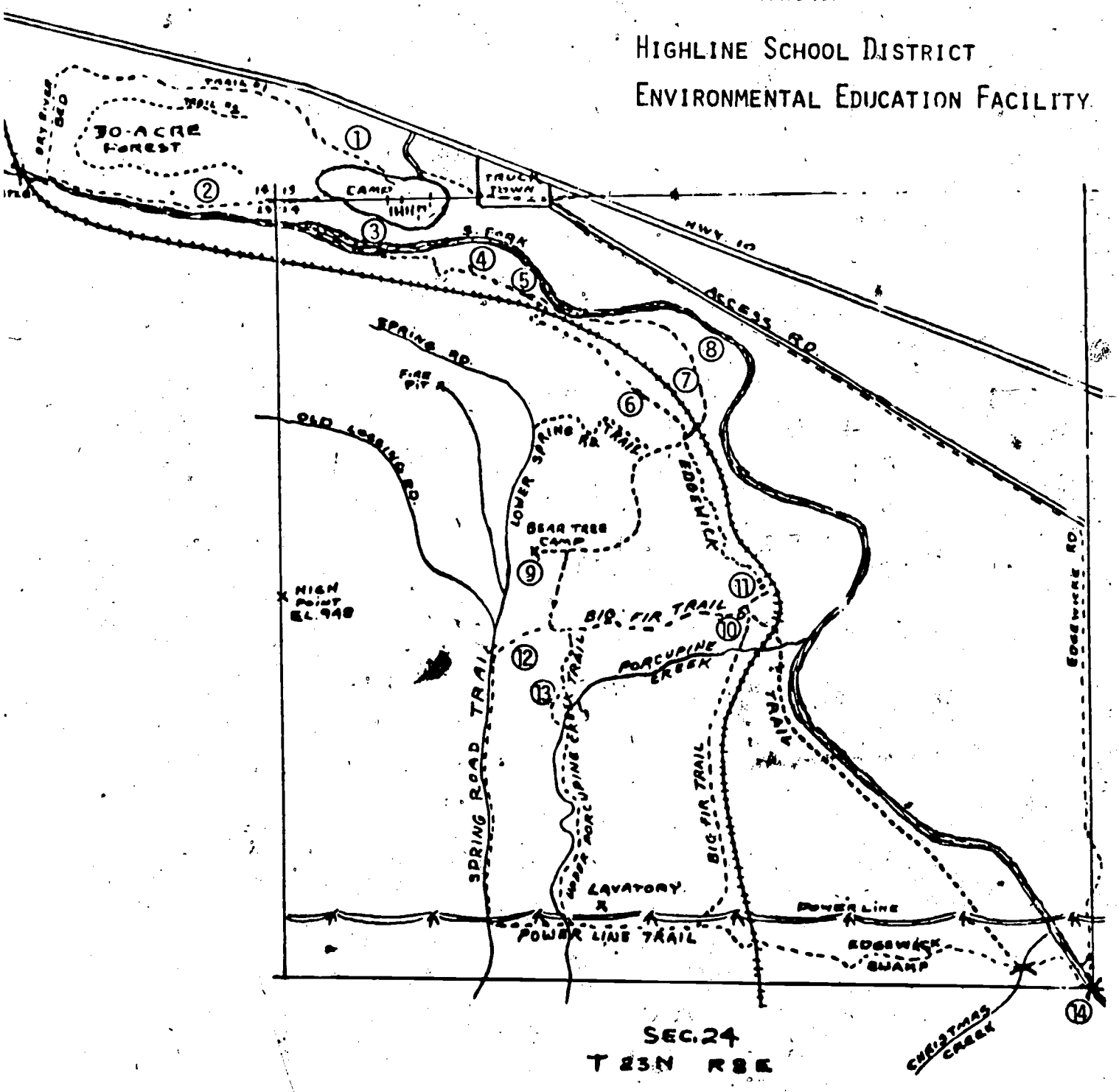
Morning break _____ A.M.
Meet for lunch _____ A.M.
Afternoon break _____ P.M.
Meet at _____ by _____ P.M.

DON'T WORRY if you don't know a lot about plants, soil, and the like. It is really better if you don't because then you won't have to resist the temptation to tell the students the answers. The purpose of this study is not to supply them with a lot of answers and facts, but rather to let them learn to really observe, question, and to formulate their own answers. Your job is to help them search and record the data accurately so they can use it for later classroom study. The students have had practice using the kits, thermometers, and the data sheets so your main role will be to keep the group working together and on a reasonable time schedule. Try to get the students to accept most of the responsibility and leadership. Discipline is usually not necessary with this kind of activity. Usually a hand on the shoulder and an interest in what the student is doing is enough to handle the problem. Have fun!

CAMP WASKOWITZ

HIGHLINE SCHOOL DISTRICT

ENVIRONMENTAL EDUCATION FACILITY



LEGEND:

1. 30 Acre Nature Trails
2. School Plots
3. Bridge over Snoqualmie River to 300 Acre Area
4. Olson Chapel
5. Start of Fire Sculpture Nature Trail
6. Crystal Springs
7. Fire Sculpture
8. River Camp
9. Bear Tree Camp
10. Big Fir
11. Silver Firs - lightning struck
12. Cedar Snag - fire damage
13. Logging Artifacts
14. Edgewick Bridge

FIELD STUDY DATA SHEET

NAME _____ LEADER _____ GROUP NUMBER ___

BIOTIC COMMUNITY # _____

LEVELS OF VEGETATION

Upper Level				Middle Level				Lower Level			
Name	Many	Few	One	Name	Many	Few	One	Name	Many	Few	One
Red Alder	X			Cream Spray		X		Bleeding Heart	X		
Cascara		X		Thimble Berries		X		TRILLIUM	X		
Dogwood			X					Siberium Lettuce		X	
								Sword Fern	X		

SOIL DATA

A	The temperature is: 55 degrees	Fahrenheit X	Centigrade	
B	What is the pH of the soil? 6			
C	The color is:	yellow-brown	chocolate-brown X	almost black
D	The texture is:	rocky	somewhat rocky X	not rocky
E	The soil is:	wet	damp X	dry
F	Can you mold your sample into a ball?	yes	no X	
G	Describe the smell of the soil: Sort of sweet, like old leaves			

LANDFORMS

What interesting objects or landforms do you find in this area?

Object	Possible Origin	Location
Hole about 8 ft. across and 3ft. deep	Uprooted Douglas Fir	N.E. Corner of site

ANIMAL DATA

Can you identify any signs of animal or insect life in this area?

Evidence	Location	Animal
Wood residue	nurse log	carpenter ants
Scratches in bark	on 3 alder trees	bear
	6 ft. from ground	

FIELD STUDY DATA SHEET

NAME _____ LEADER _____ GROUP NUMBER ____

BIOTIC COMMUNITY # _____

LEVELS OF VEGETATION

Upper Level				Middle Level				Lower Level			
Name	Many	Few	One	Name	Many	Few	One	Name	Many	Few	One

SOIL DATA

A	The temperature is: degrees	Fahrenheit ☐	Centigrade ☐	
B	What is the pH of the soil?			
C	The color is:	yellow-brown ☐	chocolate brown ☐	almost black ☐
D	The texture is:	rocky ☐	somewhat rocky ☐	not rocky ☐
E	The soil is:	wet ☐	damp ☐	dry ☐
F	Can you mold your sample into a ball?		Yes ☐	no ☐
G	Describe the smell of the soil:			

LANDFORMS

What interesting objects or landforms do you find in this area?

Object	Possible Origin	Location

ANIMAL DATA

Can you identify any signs of animal or insect life in this area?

Evidence	Location	Animal

CONCLUSIONS ABOUT BIOTIC COMMUNITIES

TEACHER INFORMATION

It is in this part of the study that the children will use the information that they have gathered. This is where they will operate on all of the various levels of reasoning from recall to application to evaluation and synthesizing. Not all children will operate on the highest levels of reasoning all of the time but all will learn and apply this information to themselves. It is in this section that the children will assume the tutor or teacher roles within their groups. The best teachers are often among the peer group.

We suggest that the children work on Conclusions in the same group that they did the in-field research. You may want them to work on one biotic community at a time with Comparisons last or you may wish to let them organize their group and work as they see fit.

Since this material covers the range of reasoning abilities, it may be considered a comprehensive evaluation of the activity as well as a valuable learning and practice activity in thinking. If you use it as an evaluation, you may use your own method of judging.

This activity is best done in the classroom. You will need one CONCLUSIONS ABOUT BIOTIC COMMUNITY # _____ for each site researched for each child. They will need only one copy of COMPARE WHAT YOU KNOW ABOUT EACH SITE per student.

CONCLUSIONS ABOUT BIOTIC COMMUNITY #____

PLANT GROWTH

A biome takes its name from the predominant growth in the area. Would this biotic community be in a coniferous biome or deciduous biome? _____
Why? _____

_____

Were the plants in the upper level of growth mostly of the same type? _____

Why do you suppose this is so? _____

_____

How are they spaced? _____

What are the prime factors that determine this? _____

_____

_____

Look at the variety of plant specimen on the middle level of growth. Do you notice a variety of specimen of predominantly one type? _____ Why? _____

_____

What does sunlight have to do with this level of growth? _____

_____

What role does the middle level of growth play for the benefit of the upper level? _____

_____ What role does the upper

level of vegetation have in relation to the middle level? _____

_____ Lower level? _____

_____

What conditions are necessary for these plants to become established as new plants? _____

When they reach maturity? _____

What future do you see for the middle level plants? _____

_____

CONCLUSIONS (Cont'd)

Are the plants on the lower level evergreen or did you see evidence that they "die back" during a certain season? _____

Will these types of plants continue to have their niche in this biotic community? _____ Why? _____

_____

ANIMALS AND INSECTS

Many animals and insects have all or part of this biotic community as their habitat. Some you could see evidence of and some you couldn't see. Every organism not only receives benefits from its community but contributes something to it as well. What evidence did you see of animals contributing to this community? _____

_____

What evidence did you see of insects contributing to this community? _____

_____

What does the upper level of vegetation contribute to the habitat of animals?

_____

Middle? _____

Lower? _____

What does the upper level of vegetation offer to benefit insect life? _____

_____ Middle? _____

_____ Lower? _____

What did you notice about the differences in the animals and insect inhabit the different levels of vegetation growth? _____

_____

SOIL

What factors do you see as contributing to the texture of the soil? How?

_____

What relation does texture of the soil have to do with the pH? _____

_____

CONCLUSIONS (cont'd)

Water drainage? _____

Temperature? _____

ENVIRONMENTAL FACTORS

What relationship do you see between air temperature and the predominant plants in this biotic community? _____

_____

How does the climate of the area affect the plants? _____

_____ What does the sunlight have to do with the plant growth? _____

Thinking about the types of plants growing at the upper and middle level of vegetation, how much direct rainfall does this site receive? _____

_____ What relation does this have to do with the amount of evaporation that takes place? _____

_____

What evidences did you see of man at this site? _____

_____

How has man received benefits from this biotic community? _____

_____

How has man contributed to the biotic community? _____

_____

What do you see as the principle factors which contribute to the total ecological environment of this biotic community? _____

_____

_____

_____

COMPARE WHAT YOU KNOW ABOUT EACH SITE

Each of the sites you research is a specific kind of biotic community, yet all are within a short distance of each other. What do you see as the main reasons the biotic communities are different? _____

_____

_____

What similarities did you notice in plant growth in researching the three biotic communities? _____

_____

_____

Similarities in the soil? _____

_____ Differences? _____

_____

Similarities in the temperature? _____

_____ Differences? _____

Why? _____

Do you see them as being more similar or more different in twenty years?

_____

Why? _____

_____

Keeping in mind that animals must have food, homebuilding materials and protection, use the information you have gathered and your past experiences to deduce what animals might live in each of these biotic communities. Remember that part of an animal's protection is concealment, so you might not have seen evidence. We're looking for ideal habitats where they have found a niche.

	Site #1	Site #2	Site #3
Upper Level			
Middle Level			
Lower Level			
Soil			

COMPARISONS (cont'd)

Which of the three biotic communities do you think is of the most benefit to the most animal and insect life? _____

Why? _____

What evidences do you see of the past history of each biotic community?

Site #1

Site #2

Site #3

Can you predict the future of each biotic community, based upon your research and what you were able to observe about the surrounding areas?

Site #1

Site #2

Site #3

What benefits do you see of each biotic community to the total ecological environment?

Site #1

Site #2

Site #3

How might each be a detriment to the development of society?

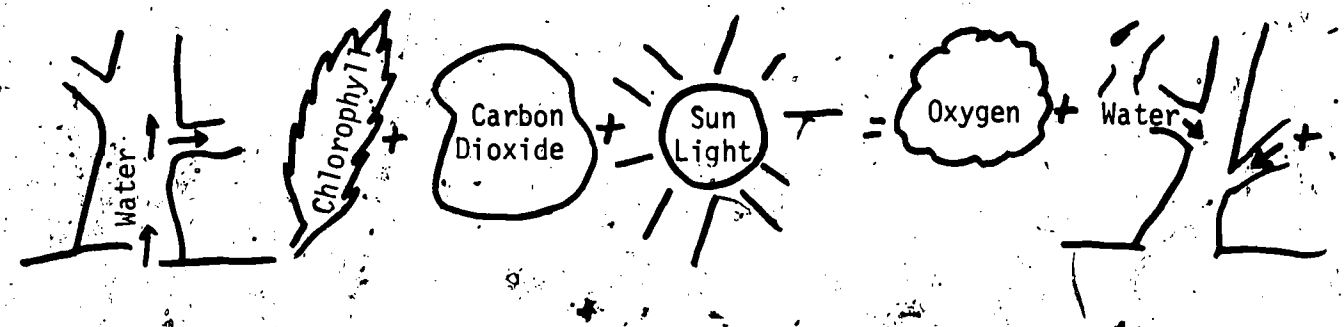
Site #1

Site #2

Site #3

COMPARISONS (cont'd)

Using the photosynthesis theory which area do you suppose has the highest level of productivity?



Which biotic community uses the most water over a period of a year? _____

_____ Why? _____

Pretend for a moment that you are a building contractor hired to choose a site for a project and that each of these three biotic communities is of equal size and accessability. Which of the three sites would you choose to build? _____ Why? _____

Stretch your thinking and see how many jobs, occupations, careers and vocations can you list that would be directly affected by the change or preservation of these biotic communities. Be creative and imaginative! When you have made your list, compare with your group members. Can your class come up with twenty-five jobs or vocations? Fifty? One hundred?! More?!!

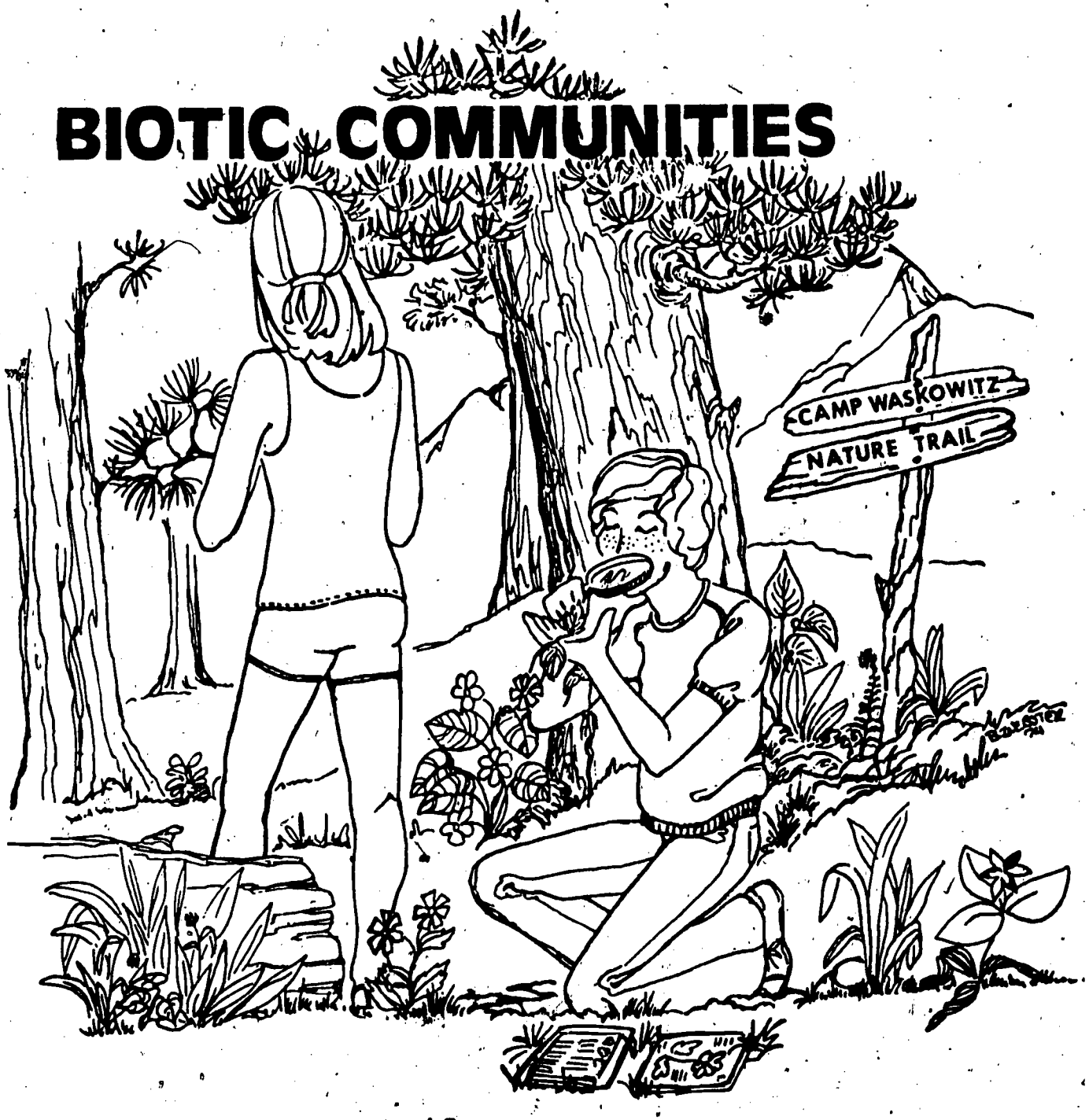
FURTHER RELATED ACTIVITIES

1. Conservation notebooks
2. Independent research on new-found interests
3. Oral reporting
4. Speakers who can clear up any unanswered questions
5. Slide and tape presentations made by the children to show similarities, differences, learnings, new ideas. Slide pictures may be made of scenes they want to show, of pictures they find in magazines and books that would tell the story, or by transfer slides (using clear contact paper and slide mounts). Call ERAC to secure camera and film.
6. Collage of several or one niche relationships within a biotic community.
7. Cartoons illustrating history or future of a biotic community
8. Produce a similar study unit to be used by another group
9. Analyze this study unit to make revisions and omissions to improve
10. Poetry collection (metered, free-form, cinquain, haiku, etc.)
11. Make plans of particular studies that class wishes to do at camp
12. Produce a continuing ecology dictionary
13. Animal research and study of live-safe animal traps
14. Compass course and mapping of the biotic communities
15. Calculating the value of the timber in any of the sites
16. Returning to the biotic communities in a different season to compare the camp and contents
17. Bird study
18. Filing results for a class to use five or ten years hence for comparisons.

Student Handbook

Name _____

BIOTIC COMMUNITIES



PRACTICE FIELD DATA SHEET

LEVELS OF VEGETATION

Name _____ Group Number _____

The purpose of these sheets is to give you some experience in gathering and recording data. It will help you work efficiently when you actually go out to a wooded area to observe and record data to bring back to the classroom for further study and discussion.

A. Look around you for the tallest plants you can see. These will usually, but not always, be trees. These plants are in the upper level of vegetation.
   1. Find the place on the chart for the upper level and write the name of one of the kinds of plants you see in this level.
   2. Decide how many plants of this same kind there are in this general area. Check the appropriate box for either many, few, or one.
   3. Do this same thing for two other kinds of plants you can see in this same level. (Not every area will have three different kinds in this level so record this accordingly.)

B. Decide which plants are in the middle level of vegetation. These will generally be shrubs and small trees. They should be taller than your waist but not as tall as the plants in the upper level. Record data for this level the same way you did for the upper level.

C. Study the lowest level of vegetation (grasses, wildflowers, ferns, vines) and record three types of them on your chart.

LEVELS OF VEGETATION

Upper Level				Middle Level				Lower Level			
Name	Many	Few	One	Name	Many	Few	One	Name	Many	Few	One

FIELD STUDY DATA SHEET

NAME _____ LEADER _____ GROUP NUMBER ____

BIOTIC COMMUNITY # _____

LEVELS OF VEGETATION

Upper Level				Middle Level				Lower Level			
Name	Many	Few	One	Name	Many	Few	One	Name	Many	Few	One

SOIL DATA

A	The temperature is: degrees	Fahrenheit ☐	Centigrade ☐	
B	What is the pH of the soil?			
C	The color is:	yellow-brown ☐	chocolate brown ☐	almost black ☐
D	The texture is:	rocky ☐	somewhat rocky ☐	not rocky ☐
E	The soil is:	wet ☐	damp ☐	dry ☐
F	Can you mold your sample into a ball?		Yes ☐	no ☐
G	Describe the smell of the soil:			

LANDFORMS

What interesting objects or landforms do you find in this area?

Object	Possible Origin	Location

ANIMAL DATA

Can you identify any signs of animal or insect life in this area?

Evidence	Location	Animal

FIELD STUDY DATA SHEET

NAME _____ LEADER _____ GROUP NUMBER ____

BIOTIC COMMUNITY # _____

LEVELS OF VEGETATION

Upper Level				Middle Level				Lower Level			
Name	Many	Few	One	Name	Many	Few	One	Name	Many	Few	One

SOIL DATA

A	The temperature is: degrees	Fahrenheit ☐	Centigrade ☐	
B	What is the pH of the soil?			
C	The color is:	yellow-brown ☐	chocolate brown ☐	almost black ☐
D	The texture is:	rocky ☐	somewhat rocky ☐	not rocky ☐
E	The soil is:	wet ☐	damp ☐	dry ☐
F	Can you mold your sample into a ball?	Yes ☐	no ☐	
G	Describe the smell of the soil:			

LANDFORMS

What interesting objects or landforms do you find in this area?

Object	Possible Origin	Location

ANIMAL DATA

Can you identify any signs of animal or insect life in this area?

Evidence	Location	Animal

FIELD STUDY DATA SHEET

NAME _____ LEADER _____ GROUP NUMBER ____

BIOTIC COMMUNITY # _____

LEVELS OF VEGETATION

Upper Level				Middle Level				Lower Level			
Name	Many	Few	One	Name	Many	Few	One	Name	Many	Few	One

SOIL DATA

A	The temperature is: degrees	Fahrenheit ☐	Centigrade ☐
B	What is the pH of the soil?		
C	The color is: yellow-brown ☐	chocolate brown ☐	almost black ☐
D	The texture is: rocky ☐	somewhat rocky ☐	not rocky ☐
E	The soil is: wet ☐	damp ☐	dry ☐
F	Can you mold your sample into a ball?	Yes ☐	no ☐
G	Describe the smell of the soil:		

LANDFORMS

What interesting objects or landforms do you find in this area?

Object	Possible Origin	Location

ANIMAL DATA

Can you identify any signs of animal or insect life in this area?

Evidence	Location	Animal

PRACTICE FIELD DATA SHEET

SOIL

Name _____ Group Number _____

Maybe you've noticed how different soils seem to be in different places. Near the ocean the soil is almost all sand, and along some river banks it is thick and slimy with clay, fill dirt pushed along a ditch is likely to be light colored and gritty, mixed with rocks, while in the woods it often feels soft and rich and looks chocolate brown. Soil does vary from place to place and maybe you can discover some of the reasons for this.

A. Find a spot where the soil is exposed. Use a stick or pencil to make a hole five or six inches deep and insert the thermometer into it. Ease the dirt around the stem of the thermometer and let it remain in the soil for about five minutes before you read and record the temperature.
B. Use the kit instructions to take a pH reading of the soil in this same spot.
C. Look carefully at the color of the soil.
D. Feel the soil to determine its texture. You may need to study the whole area to decide whether or not it is rocky.
E. How wet does the soil feel?
F. Hold some of the soil in your hand and try to squeeze it into a ball. Does it retain this shape when you unclasp your hand?
G. Can you describe the smell of the soil? You may not agree with the others of your group on the smell of the soil, but give your own opinion.
H. Fill your soil sample jar with soil from your area. Label the jar with your group number.

Use the chart below to record the data from above:

SOIL DATA

A	The temperature is: degrees		Fahrenheit	Centigrade
B	What is the pH of the soil?			
C	The color is:	yellow-brown	Chocolate-brown	almost black
D	The texture is:	rocky	somewhat rocky	not rocky
E	The soil is:	wet	damp	dry
F	Can you mold your sample into a ball?		yes	no
G	Describe the smell of the soil:			

CONCLUSIONS ABOUT BIOTIC COMMUNITY # _____

PLANT GROWTH

A biome takes its name from the predominant growth in the area. Would this biotic community be in a coniferous biome or deciduous biome? _____
Why? _____

_____

Were the plants in the upper level of growth mostly of the same type? _____

Why do you suppose this is so? _____

_____

How are they spaced? _____

What are the prime factors that determine this? _____

_____

_____

Look at the variety of plant specimen on the middle level of growth. Do you notice a variety of specimen of predominantly one type? _____ Why? _____

_____

What does sunlight have to do with this level of growth? _____

_____

What role does the middle level of growth play for the benefit of the upper level? _____

_____ What role does the upper level of vegetation have in relation to the middle level? _____

_____ Lower level? _____

_____

What conditions are necessary for these plants to become established as new plants? _____

When they reach maturity? _____

What future do you see for the middle level plants? _____

_____

CONCLUSIONS (Cont'd)

Are the plants on the lower level evergreen or did you see evidence that they "die back" during a certain season? _____

Will these types of plants continue to have their niche in this biotic community? _____ Why? _____

_____

ANIMALS AND INSECTS

Many animals and insects have all or part of this biotic community as their habitat. Some you could see evidence of and some you couldn't see. Every organism not only receives benefits from its community but contributes something to it as well. What evidence did you see of animals contributing to this community? _____

_____

What evidence did you see of insects contributing to this community? _____

_____

What does the upper level of vegetation contribute to the habitat of animals?

_____

Middle? _____

Lower? _____

What does the upper level of vegetation offer to benefit insect life? _____

_____ Middle? _____

_____ Lower? _____

What did you notice about the differences in the animals and insect inhabit the different levels of vegetation growth? _____

_____

SOIL

What factors do you see as contributing to the texture of the soil? How?

_____

What relation does texture of the soil have to do with the pH? _____

_____

CONCLUSIONS (cont'd)

Water drainage? _____

Temperature? _____

ENVIRONMENTAL FACTORS

What relationship do you see between air temperature and the predominant plants in this biotic community? _____

_____

How does the climate of the area affect the plants? _____

_____ What does the sunlight have to do with the plant growth? _____

Thinking about the types of plants growing at the upper and middle level of vegetation, how much direct rainfall does this site receive? _____

_____ What relation does this have to do with the amount of evaporation that takes place? _____

_____

What evidences did you see of man at this site? _____

_____

How has man received benefits from this biotic community? _____

_____

How has man contributed to the biotic community? _____

_____

What do you see as the principle factors which contribute to the total ecological environment of this biotic community? _____

_____

_____

_____

COMPARE WHAT YOU KNOW ABOUT EACH SITE

Each of the sites you research is a specific kind of biotic community, yet all are within a short distance of each other. What do you see as the main reasons the biotic communities are different? _____

_____

_____

What similarities did you notice in plant growth in researching the three biotic communities? _____

_____

_____

Similarities in the soil? _____

_____ Differences? _____

_____

Similarities in the temperature? _____

_____ Differences? _____

Why? _____

Do you see them as being more similar or more different in twenty years?

_____

Why? _____

_____

Keeping in mind that animals must have food, homebuilding materials and protection, use the information you have gathered and your past experiences to deduce what animals might live in each of these biotic communities. Remember that part of an animal's protection is concealment, so you might not have seen evidence. We're looking for ideal habitats where they have found a niche.

	Site #1	Site #2	Site #3
Upper Level			
Middle Level			
Lower Level			
Soil			

COMPARISONS (cont'd)

Which of the three biotic communities do you think is of the most benefit to the most animal and insect life? _____

Why? _____

What evidences do you see of the past history of each biotic community?

Site #1

Site #2

Site #3

Can you predict the future of each biotic community, based upon your research and what you were able to observe about the surrounding areas?

Site #1

Site #2

Site #3

What benefits do you see of each biotic community to the total ecological environment?

Site #1

Site #2

Site #3

How might each be a detriment to the development of society?

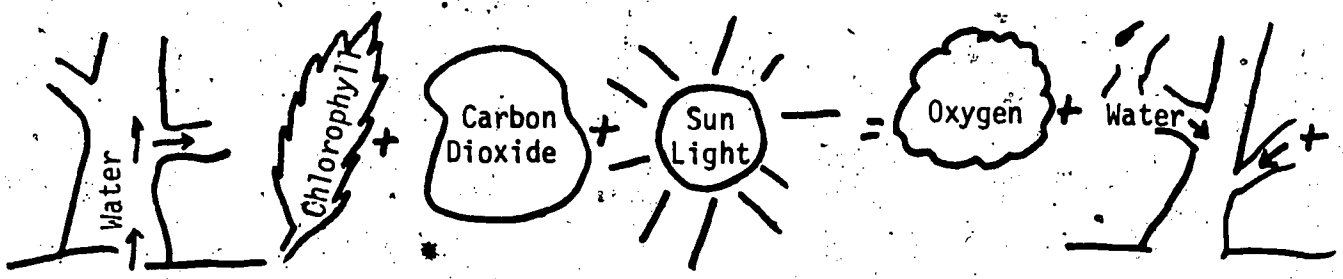
Site #1

Site #2

Site #3

COMPARISONS (cont'd)

Using the photosynthesis theory which area do you suppose has the highest level of productivity?



Which biotic community uses the most water over a period of a year? _____

_____ Why? _____

Pretend for a moment that you are a building contractor hired to choose a site for a project and that each of these three biotic communities is of equal size and accessability. Which of the three sites would you choose to build? _____ Why? _____

Stretch your thinking and see how many jobs, occupations, careers and vocations can you list that would be directly affected by the change or preservation of these biotic communities. Be creative and imaginative! When you have made your list, compare with your group members. Can your class come up with twenty-five jobs or vocations? Fifty? One hundred?! More?!!

Amoe-Thorson Pak

NAME _____
GRADE _____
TEACHER _____

Directions

Put your name, grade, and teacher's name at the top of the page. For each of the questions below, circle the answer you think is best.

1. A biotic community is
   a. an ecologically conscious community
   b. an area of interacting plants and animals
   c. a plot of land devoted to biological experimentation
   d. a group of underwater farms

2. Which type of plant occupies a niche?
   a. a deciduous plant
   b. a fern or other spore-bearing plant
   c. a mushroom or other parasitic plant
   d. all of these

3. Soil with low pH is
   a. acid
   b. alkaline
   c. neutral
   d. sour

4. Soil with a high pH probably contains much
   a. glacial till
   b. sand and rocks
   c. clay
   d. decaying plant material

5. Which type of plant requires a high pH?
   a. upper level
   b. deciduous
   c. coniferous
   d. broadleaf

6. Which of the following is a deciduous plant?
   a. maple tree
   b. madrona tree
   c. fern
   d. moss
   e. mushroom

7. Which of these would <u>not</u> be a tool used to gather data on a biotic community?
   a. thermometer
   b. light meter
   c. small axe
   d. soil test kit
   e. magnifying glass

8. An area where lots of oak trees grow would be called
   a. a coniferous biome
   b. a deciduous biome
   c. an evergreen biome
   d. an alkaline biome

9. Although three biotic communities may be very near each other, the soils may not receive the same amount of rainfall because
   a. plant coverage varies
   b. altitude varies
   c. cloud cover varies
   d. temperature varies

10. Which gas is a product of photosynthesis?
   a. nitrogen
   b. oxygen
   c. hydrogen
   d. carbon monoxide

11. Which gas do plants need in order to produce sugar?
   a. nitric oxide
   b. sulphur dioxide
   c. carbon monoxide
   d. carbon dioxide

12. Which of the following is a coniferous plant?
   a. a Douglas fir
   b. a Japanese maple
   c. an asparagus fern
   d. a wild grass
   e. a blackberry vine

13. Lower level vegetation is made up of plants which
   a. are eaten by the more primitive animals
   b. are toward the lower end of the food chain
   c. grow close to the ground
   d. survive at low elevations, near sea level

14. Ecology is the study of
   a. how pollution affects plants and animals
   b. how man can control nature
   c. what man needs to survive
   d. how plants, animals, and the environment interact

15. You are Game and Wildlife Commissioner. A Washington State farmer asks if he can bring from Africa a herd of one hundred antelope to put on his farm as a tourist attraction. What would you tell him?
   a. Yes. We want to attract more tourists to Washington State.
   b. Yes, if you make certain they are not disease-carrying.
   c. Not until we study the animal's effect on the plants and animals already here.
   d. No, the state's wildlife is already overpopulated.